REMARKS

The present invention is a wireless communication system for automatically setting a channel frequency and a tone squelch frequency and a method for automatically setting a channel frequency and a tone squelch frequency in a wireless communication system for transmission of modulated information.

The present invention automates the process by which channel frequencies and the tone squelch frequencies are set without requiring the input thereof from the user. As is illustrated in Figs. 3 and 4, different countries allocated different channels which differ in number which are assigned frequency values. For radio systems utilizing a continuous tone controlled squelch system (CTCSS), a corresponding set of tone frequencies for channels is set to control squelch operation.

The present invention utilizes code input 10 and a code memory 30 which are read by controller 20 to control the selection of channel frequencies and tone squelch frequencies by converting a multiple digit input from code input 10 into the corresponding channel frequencies such as those illustrated in Fig. 3 and the corresponding CTCSS tone frequencies illustrated in Fig. 4. As indicated in paragraph [0026] of the Substitute Specification, "the invention requires only the input from the numeric keys of the five digits without performing inputs according to the setting of a channel frequency and a tone frequency, so that a corresponding frequency channel and tone squelch is automatically set, thereby enhancing the convenience of use."

A wireless communication system for automatically setting a channel frequency and a tone squelch frequency in accordance with the invention includes an antenna 70 which receives information signals modulated on a channel; a duplexer 60, coupled to the antenna, which passes the information signal received by the antenna; an amplifier and filter 80, coupled to the information signal passed by the duplexer, which passes only a selected frequency band from the information signal passed by the duplexer; a mixer 90, coupled to the selected frequency band passed by the filter and to a local oscillator 85 producing a local oscillator signal, which provides a mixed signal from the selected frequency band and the local oscillator signal; a demodulator 95, coupled to the mixed signal, which modulates the mixed signal to produce a demodulated signal; a squelch circuit 98, coupled to the demodulated signal and to a transmitted signal, which generates a sound signal from the demodulated signal or combines the transmit signal with a tone squelch signal provided by the tone squelch circuit for providing a transmission of the transmit signal; a transmit modulator 50, coupled to the combined transmit signal and tone squelch signal, which modulates the combined transmit signal and tone signal to generate a transmit modulator signal which is transmitted by the antenna; and a controller 20, coupled to a code input 10, a display 40 representing a code input to the controller and a memory 30 which stores channel frequency codes and tone squelch frequency codes, which converts codes input from the code input into a channel frequency code corresponding to a transmit frequency used to transmit the transmit signal and into a tone squelch frequency code corresponding to a tone squelch frequency.

Claim 1 stands rejected under 35 U.S.C. §112, second paragraph, as being indefinite. Newly submitted claim 3, which corresponds to claim 1, has been drafted to overcome the stated grounds of rejection.

Claim 1 stands rejected under 35 U.S.C. §103 as being unpatentable over United States Patent 4,484,355 (Henke et al) in view of United States Patent 5,327,580 (Vignali et al). This ground of rejection is traversed with respect to newly submitted claim 3 for the following reasons.

Claim 3 recites:

> A wireless communication system for automatically setting a channel frequency and a tone squelch frequency comprising:
> an antenna which receives information signals modulated on a channel;
> a duplexer, coupled to the antenna, which passes the information signal received by the antenna;
> an amplifier and filter, coupled to the information signal passed by the duplexer, which passes only a selected frequency band from the information signal passed by the duplexer;
> a mixer, coupled to the selected frequency band passed by the filter and to a local oscillator producing a local oscillator signal, which provides a mixed signal from the selected frequency band and the local oscillator signal;
> a demodulator, coupled to the mixed signal, which demodulates the mixed signal to produce a demodulated signal;
> a squelch circuit, coupled to the demodulated signal and to a transmit signal, which generates a sound signal from the demodulated signal or combines the transmit signal with a tone squelch signal provided by the tone squelch circuit for providing a transmission of the transmit signal;
> a transmit modulator, coupled to the combined transmit signal and tone squelch signal, which modulates the combined transmit signal and tone squelch signal to generate a transmit modulator signal which is transmitted by the antenna; and
> a controller, coupled to a code input, a display for displaying a code provided by the code input and a memory which stores channel frequency codes and tone squelch frequency codes and converts code inputs from the code input into a channel frequency code corresponding to a transmit frequency used to transmit the transmit signal and into a tone squelch frequency code corresponding to a tone squelch frequency.

There is no counterpart in Henke et al of the claimed wireless communication system for automatically setting a channel frequency and a tone squelch frequency including the aforementioned controller and associated code input display and memory.

Henke et al disclose a handheld transceiver with frequency synthesizer and sub-audible tone squelch system. Encoder/decoder 24 includes a programmable filter network 36 which is programmable by the contents of shift register 40 to respond during receive mode to the presence of a sub-audio tone at a desired frequency. Squelch circuit 38 is opened when a sub-audio tone is detected. PROM 54 controls the generation of transmitting and receiving carrier frequencies and associated sub-audio tone frequencies. The controller 52 controls the transfer of data words from the PROM 54 to the frequency synthesizer 18 and to the tone frequency synthesizer to control the generation of carrier and tone frequencies. See column 4, lines 64-68, through column 5, lines 1-5.

Henke et al do not automatically generate channel frequencies and tone squelch frequencies under the control of a controller which is associated with a code input in which the controller converts codes input from the code input into a channel frequency code corresponding to a transmit frequency and into a tone squelch frequency code corresponding to a tone squelch frequency.

Moreover, there is no basis why a person of ordinary skill in the art would be led to modify the teachings of Henke et al based upon Vignali et al. Vignali et al has been cited for teaching that full duplex or half duplex can be used to transmit and receive signals at different frequencies. However, this teaching does not cure the deficiencies noted above with regard to Henke et al with respect to claim 3.

Claim 2 stands rejected under 35 U.S.C. §102 as being anticipated by Henke et al. This ground of rejection is traversed with respect to newly submitted claim 4 for the following reasons.

Claim 4 recites:

> A method for automatically setting a channel frequency and a tone squelch frequency in a wireless communication system for transmission of modulated information comprising steps of:
> storing channel frequency codes and tone squelch frequency codes in a memory;
> inputting data, corresponding to a specified channel frequency code and a specified tone squelch frequency code, through a code input, during a waiting mode of a system;
> converting the wireless system into a transmit mode of operation after the inputting data;
> using the data to set a channel frequency code and a tone squelch frequency code after the converting the wireless system into the transmit mode; and
> selecting the channel frequency and a modulation frequency used during the transmit mode to transmit the modulated information according to the frequency channel code and the tone squelch frequency code and transmitting the modulated information according to the modulating frequency from a modulator through a duplexer to an antenna.

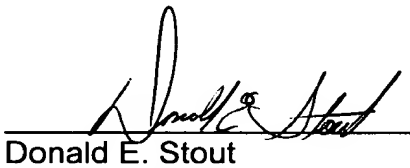
Henke et al do not disclose the inputting data, converting, setting and selecting steps of claim 4.

To the extent necessary, Applicants petition for an extension of time under 37 C.F.R. §1.136. Please charge any shortage in fees due in connection with the

filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (1081.39545X00) and please credit any excess fees to such Deposit Account.

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP



Donald E. Stout
Registration No. 26,422
(703) 312-6600

DES:dlh

APPENDIX

#5/Sub.Spec(N.E)
1/14/04
a.D.

1081.39545X00

SUBSTITUTE SPECIFICATION

Title of the Invention

Wireless Communication Method and System For Automatically Setting Frequency Channel and Tone Squelch

Background of the Invention

Field of the Invention

[0001] The invention is related to providing a wireless communication method and system for automatically setting a frequency channel and a tone squelch by a numeric code input, and particularly, to providing a wireless communication method and system for programming a combination of a channel frequency and a tone squelch using an automatic channel frequency selecting code and a continuous tone controlled squelch system (CTCSS) and setting a frequency channel and a tone frequency, automatically, according to a predetermined code inputted during the transmit-receive operating.

Description of the Prior Art

[0002] A conventional wireless communication system using FRS performs the communication with another communication system in a manner that a transmit communication system sets a communication frequency channel of a receiving communication system and then transmits predetermined information and converts into a receive mode, and the receive communication system converts from the receive mode into the transmit mode so as to transmit information responsive to the transmit information from the transmit communication system.

[0003] The conventional wireless communication system has problems when an alternative communication or a simultaneous communication occurs. The communication method needs the confirmation of the communication condition

before the communication operation. The transmitting communication system uses a communication frequency and a continuous tone controlled squelch (CTCS) or DCD of the receiving communication system. Also, if the receiving communication system uses a different communication frequency and tone squelch, the transmitting communication system must identify the tone squelch code and frequency of the receiving communication system upon every change of the channel frequency and tone squelch frequency and requires the changed input.

[0004] Accordingly, an object of the invention is to provide a wireless communication method and system for programming a combination of a channel frequency and a tone squelch using an automatic channel frequency selecting code and a continuous tone controlled squelch system code and setting a frequency channel and a tone squelch frequency, automatically, according to a predetermined code inputted during the transmit-receive operation.

[0005] The other object of the invention is to provide a wireless communication method and system for combining a channel frequency and a tone squelch frequency in a numeric code and sets the channel frequency and a tone squelch frequency, automatically, according to a specific numeric code input that is easily recalled and enables convenient use during the transmit-receive operating.

SUMMARY OF THE INVENTION

[0006] In order to satisfy these objects, according to the invention a wireless communication system for automatically setting a frequency channel and a tone squelch comprises a filter and amplifier for filtering/amplifying only a necessary frequency band from a received information signal received by an antenna and passing through a duplexer portion; a mixer for mixing the band frequency with a phase synchronizing signal from a local oscillator; a demodulator for demodulating a signal from the mixer and supplying the demodulated signal to a speaker; a received

tone squelch circuit for separating a sound signal from the demodulated signal; a transmit modulator for combining a transmit signal input with a transmit tone squelch frequency from a transmit tone squelch circuit and demodulating the combined signal; a controller for converting a code previously inputted into a code input into a frequency and tone squelch code; a memory for storing data, which is coded corresponding to a frequency channel data and a tone squelch code selected by the controller, at a predetermined address region; and a display for representing a frequency, etc. set by the controller.

[0007] A wireless communication method for selecting a communication frequency comprises steps of: storing a frequency channel code and a modulating frequency converting code in a memory; inputting data at a waiting mode of a system corresponding to the frequency channel code and the modulating frequency converting code; converting into a transmit mode after the completion of the inputting data ; setting a frequency channel according to the frequency channel code after the completion of the converting into the transmit mode; and transmitting information according to the modulating frequency convert code after the completion of setting of the frequency channel setting.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The invention now will be described in detail with reference to the accompanying drawings, in which:

[0009] Fig. 1 is a block diagram illustrating a wireless communication system according to the invention;

[0010] Fig. 2 is a view illustrating a code for the frequency channel selection and a tone squelch code of the wireless communication system according to the invention;

[0011] Fig. 3 is a view of tables illustrating frequencies of channel codes divided into countries used in the wireless communication system according to the invention;

[0012] Fig. 4 is a table illustrating frequencies of a tone code of a continuous tone controlled squelch system of the wireless communication system (CTCSS) according to the invention;

[0013] Fig. 5 is a table illustrating tone codes of DCD system of the wireless communication system according to the invention; and,

[0014] Fig. 6 is a flow chart illustrating the operating of the wireless communication system according to the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0015] Fig. 1 shows a block diagram of a wireless communication system. A filter and amplifier 80 includes an amplifier and a band pass filter for amplifying a received information signal received by an antenna 70 which has passed through a duplexer 60 and filtering only a necessary frequency band from the received information signal. A mixer 90 mixes the received signal from the filter and amplifier 80 with a phase synchronizing signal from a local oscillator 85 to apply the mixed signal to a demodulator 95. The local oscillator 85 applies a tone squelch control signal to a tone squelch circuit 98.

[0016] The tone squelch circuit 98 removes a tone squelch frequency signal from the demodulated signal from the demodulator 95 to generate a sound signal. In other words, the tone squelch circuit 98 includes a receive tone squelch circuit and a transmit tone squelch circuit connected to a microphone or a transmit circuit, etc. (not shown), in which the transmit tone squelch circuit combines a transmit signal from the transmit circuit with a tone squelch signal to supply the combined signal to a

transmit modulator 50, and the receive tone squelch circuit applies the sound signal to a sound signal amplifier 100 to output the sound.

[0017] The transmit modulator 50 modulates the combined signal and applies the modulated signal to a transmit power amplifier 55. The transmit power amplifier 55 amplifies the modulated signal and applies the amplified signal to the duplexer 60 and the antenna 70 to be transmitted to another wireless communication system.

[0018] A controller 20 includes a code input 10, a display 40 for representing the code inputted and a code memory 30 for storing data corresponding to a transmit-receive frequency and a tone squelch frequency at a predetermined address region, when code data inputted into the code input 10 is converted.

The wireless communication system operates as follows: Fig. 2 shows a code for the frequency channel selection and a tone squelch code of the wireless communication system. As shown in Figs. 3 and 4, the memory 30 stores different channel frequencies and tone squelch codes or frequencies at every specific address. The channel frequency is allotted to countries as shown in Fig. 3. For example, the South Korea has 25 channel frequencies, the United States has 14 channel frequencies, New Zealand has 40 channel frequencies, Australia has 24 channel frequencies, Taiwan has 14 channel frequencies and Singapore has 10 channel frequencies. Therefore, each country allots any one of 00 to 99 as a two digit number corresponding to a channel frequency to every channel frequency. The table of Fig. 3 is stored in a memory of a wireless communication system in the form of a lookup table.

[0019] As shown in Fig. 4, the tone squelch of the continuous tone controlled squelch system has total 40 squelch frequencies to which any one of 000 to 999 as a three digit number corresponding to each tone frequency is allotted. A000" represents a non-modulation of the CTCSS.

[0020] As shown in Fig. 5, a digital tone squelch includes total 83 tone codes, to which any one of 000 to 999 as a three digit number corresponding to each tone frequency is allotted.

[0021] Fig. 6 shows a flow chart of a wireless communication method according to the invention. The wireless communication method comprises steps as follows: step S1 shows that the communication system is in a waiting mode. The memory 30 stores required channel frequencies and tone frequencies previously inputted at the specific address region. At step S2, it is judged whether the input 10 receives continuous inputs of a numeric key to make five digits corresponding to a frequency channel code and a tone frequency necessary for transmitting a specific information as shown in Fig. 2.

[0022] Next, if the transmit mode is selected or a user presses a TALK key, step S2 goes to step S3 at which the controller 20 reads the first two digits of the five digits inputted referring to the tone frequency table stored at the memory 30 and generates a frequency code and a tone code. Step S3 proceeds to step S4 at which the controller 20 sets a transmit frequency and a corresponding tone frequency.

[0023] At stepS5, it is judged whether a transmit input exists. If so, step S5 goes to step S6 at which the controller 20 performs the transmit process in a manner to obtain the two digit code of the five digit code input into the input 10 to select the frequency channel and three digit code to select the modulation frequency. The modulator 50 applies the transmit signal through the duplexer 60 and the antenna 70 to another wireless communication system.

[0024] At step S7, it is judged whether the transmit is finished. If so, step S7 branches to step S8 at which the wireless communication system converts into the receive waiting mode 1.

[0025] If the wireless communication system is not in the transmit mode, step 5 goes to step S8 at which it is judged whether the receive signal exists. If so, step 8 goes to step S9 at which the controller 20 performs the receive process. Step S9 proceeds to step S10 at which it is judged whether the receive process is terminated. If so, step 10 jumps to step S1 that the wireless communication system converts into the receive waiting mode S1.

[0026] As described above, the invention requires only the input from numeric keys of the five digits without performing inputs according to the setting of a channel frequency and a tone squelch, so that a corresponding channel frequency and tone squelch is automatically set, thereby enhancing the convenience of use.

ABSTRACT OF THE DISCLOSURE

A wireless communication system comprises a filter and amplifier for filtering/amplifying only a necessary frequency band from a received information signal received by an antenna which is passed by a duplexer; a mixer for mixing the necessary frequency band frequency with a signal from a local oscillator; a demodulator for demodulating a mixed signal from the mixer and supplying the demodulated signal to a speaker; a received tone squelch circuit for separating a sound signal from the demodulated signal; a transmit modulator for combining a transmit signal input with a transmit tone squelch frequency from a transmit tone squelch circuit and modulating the combined signal; and a controller for converting a code previously inputted into a code input coupled thereto into a frequency and tone squelch code, a memory coupled to the controller for storing data, which is coded corresponding to a channel frequency data and a tone squelch code selected by the controller, at a predetermined address region, and to a display for representing a frequency, set by the controller, thereby selecting a channel frequency and a tone squelch frequency, automatically, according to a code input.

#4

Approved
3/9/04

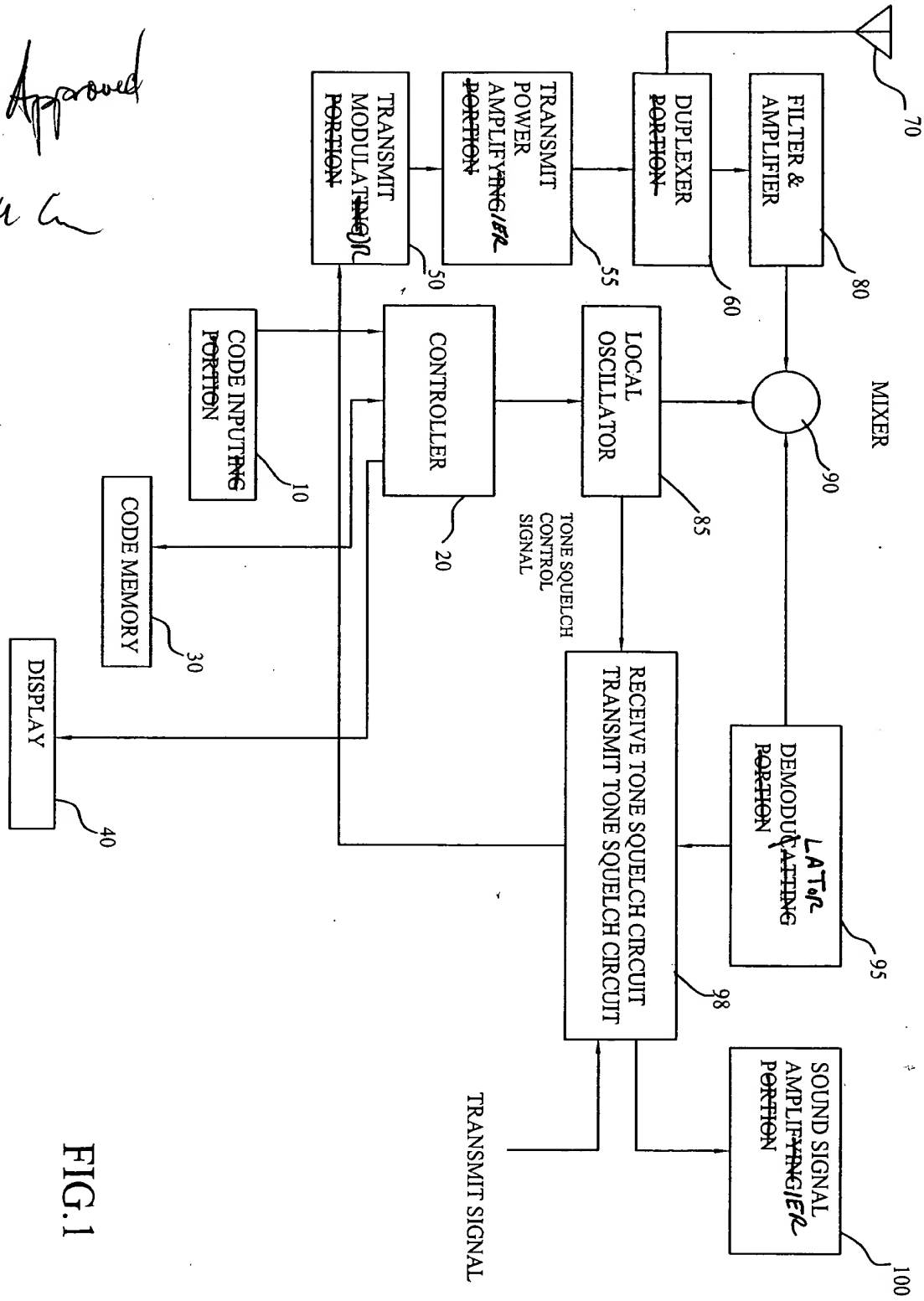


FIG.1